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LITIGATION TECHNICAL SUPPORT AND SERVICES

ROCKY MOUNTAIN ARSENAL

FINAL
TECHNICAL PLAN
VERSION 3.1

DECEMBER 1987

TASK NO. 31
BASIN F INTERIM RESPONSE ACTION SUPPORT
CONTRACT NO. DAAK11-84-D-0017

EBASCO SERVICES INCORPORATED
R.L. STOLLAR AND ASSOCIATES
CALIFORNIA ANALYTICAL LABORATORIES, INC.
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ROCKY MOUNTAIN ARSENAL CLEANUP



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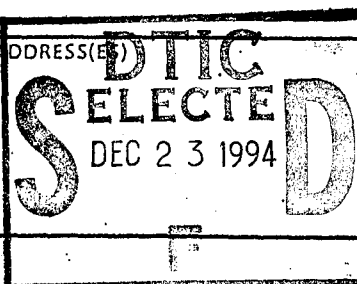
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THE PRIMARY OBJECTIVE OF TASK 31 IS TO PROVIDE SUPPORT FOR THE SUPPLEMENTAL BASIN F ACTIVITIES TO BE CONDUCTED BY THE PM. THE SPECIFIC OBJECTIVES ARE:

1. PERFORM SAMPLING AND ANALYSIS OF SOIL, LIQUID, SURFACE WATER, AND GROUND WATER IN AND AROUND BASIN F
2. PERFORM TECHNICAL ASSESSMENTS ON THE PROPOSED BASIN F INTERIM RESPONSE ACTIONS
3. CONDUCT LIQUID LEVEL MEASUREMENTS AND ESTIMATE VOLUME OF LIQUID IN BASIN F
4. DETERMINE IF THE LIQUID IN THE SOUTHERN POOLS CAN BE TREATED BY CONVENTIONAL METHODS
5. ASSESS THE RISK FROM OFF-GASSING.

THIS DOCUMENT PRESENTS A GENERAL APPROACH FOR THE POTENTIAL WORK ASSIGNMENTS. SECTIONS PROVIDE INFORMATION ON SAMPLING TECHNIQUES, CHEMICAL ANALYSIS, QUALITY CONTROL, HEALTH AND SAFETY PROGRAMS, AND DATA MANAGEMENT.

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U.S. ARMY PROGRAM MANAGER'S OFFICE FOR
ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

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TASK 31
TECHNICAL PLAN

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1.0 INTRODUCTION

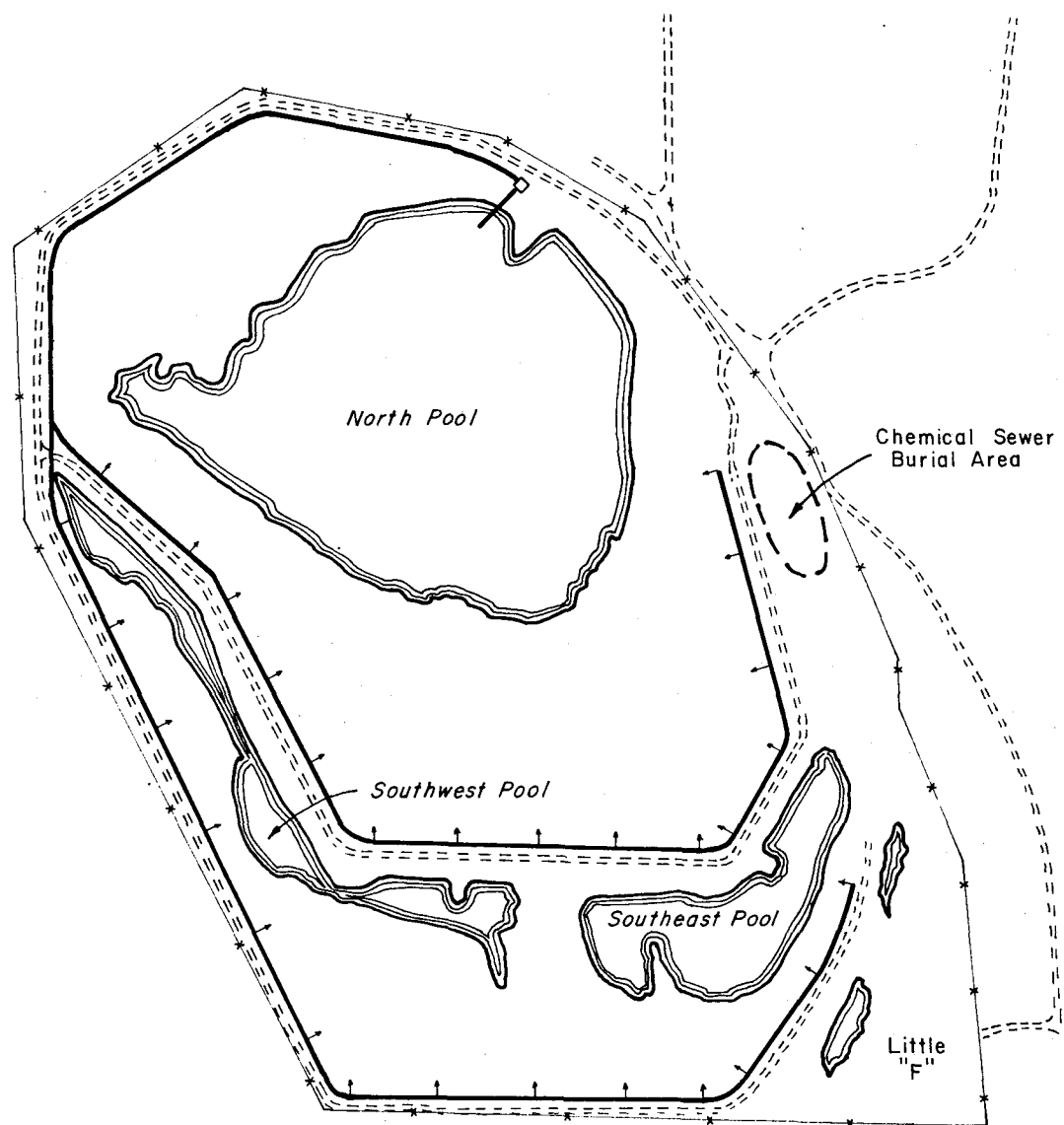
1.1 BACKGROUND

Wastes and waste streams from the various chemical processing operations conducted at the Rocky Mountain Arsenal (RMA), established in 1942, were initially discharged into unlined evaporation basins (surface impoundments) in Sections 26, 35, and 36, and were identified as Basins A through E. In 1956, an asphalt-lined evaporation basin designed for total retention of the chemical wastewaters was constructed in Section 26 and designated as Basin F. At maximum capacity, this basin had a surface area of approximately ninety acres and a volume of approximately 243 million gallons. No new liquid has been added to the basin since 1982, but liquid is still present from previous discharges.

The bottom of the basin and the interior dike walls are lined with an asphaltic liner, approximately 3/8 inch thick. A one foot layer of soil was placed on top of the liner to protect it. Riprap was added to the basin in 1957 to prevent wave damage to the liner. In 1962, a low dike was constructed across the southeast corner of the basin. This dike enclosed an area of approximately eight acres commonly referred to as "Little F".

An enhanced evaporation system was installed in 1982 and consists of a new dike across the lower third of the basin, a discharge pump, and a pipe network to distribute the liquid. As designed, liquid from the existing pool, referred to as the "North Pool," is pumped through the supply line to two trickler lines, which distribute the liquid over the exposed surface of the basin to increase the area for evaporation. Liquid from the inner trickler line flows back to the existing pool while liquid from the outer trickler line ponds behind the new dike forming a new liquid pool, referred to as the "South Pool," increasing the surface area for evaporation. The trickler lines have been used in combination and individually, although presently only the inner line is operating. Recently, the South Pool has divided into two liquid pools: the Southeast Pool and the Southwest Pool. A schematic diagram of Basin F is presented in Figure 1.1-1.

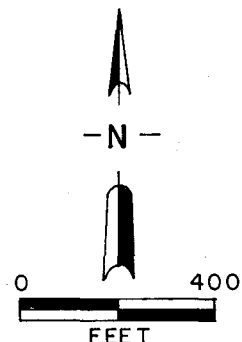
Discharge of contaminated wastes to Basin F ceased in 1982 when the chemical sewer line that fed the basin was removed. The sewer line was excavated and



Legend

- ==== Unimproved Road
- ↑ ↑ Enhanced Evaporation Piping
- * — * Existing Fence

Note: Pool surface areas
as of October, 1986



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Program Manager's Office for
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Aberdeen Proving Ground, Maryland

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FIGURE I.1-1

Schematic Diagram of Basin F

Rocky Mountain Arsenal, Task 31

Prepared by: Ebasco Services Incorporated

removed from a point immediately north of the South Plants area to the southeast corner of the basin. A section of the chemical sewer line in Sections 35 and 36 from the North Plants area was also removed. The removed sewer line and associated contaminated soil, consisting of approximately 12,000 cubic yards of total material, are stored in a lined waste pile in the fenced enclosure of Basin F.

There are at least two Interim Response Actions that will be conducted at RMA; removal of Basin F contaminated liquid, sludge and soil, and construction of a groundwater interception and treatment system to the north of Basin F. Design activities for these Basin F Interim Response Actions are currently underway. The Interim Response Actions are being carried out through the Corps of Engineers (COE), Omaha District, by the Program Manager for Rocky Mountain Arsenal Contamination Cleanup (PM-RMA). Supplemental activities that will be conducted to support the Interim Response Actions include sampling and analyses, design reviews, contamination assessments and technical consultations. Support for PM-RMA's efforts to accomplish these supplemental activities will be provided by the Ebasco team under Task Order No. 31.

1.2 OBJECTIVES

The primary objective of Task 31 is to provide support for the supplemental Basin F activities to be conducted by the PM-RMA. The specific objectives of this task are to:

- o Perform sampling and analysis of soil, liquid, surface water, and groundwater in and around Basin F as requested by PM-RMA to support the Basin F Interim Response Actions;
- o Perform technical assessments, as requested by PM-RMA, on the proposed Basin F Interim Response Actions;
- o Conduct Basin F liquid level measurements and estimate the volume of liquid in the basin;

- o Perform a technical assessment of the southern pools of liquid in Basin F to determine if the liquid can be treated by conventional methods and not treated as Basin F liquid; and
- o Assess the risk to human health resulting from off-gassing during Basin F Interim Response Actions.

1.3 TECHNICAL APPROACH

Most of the specific work assignments to be accomplished by this task are unknown at this time. A general approach for the potential work assignments is presented in the following sections. A detailed description of the technical approach to complete each major work assignment will be developed and submitted to PM-RMA for approval upon receipt of the specific work assignment and prior to completing each assignment. A final report will be developed for each major work assignment.

The approach to be used for estimating Basin F liquid volumes and for assessing the treatability of the southern pools of liquid will rely heavily on a detailed evaluation of historical records, prior sampling and analysis results, and previous investigations. The Basin F liquid volume estimates will be based on actual measurements of the liquid depth and will utilize previously developed depth to volume relationships. The treatability assessment will include collecting liquid samples from the southern pool and analyzing these samples to quantify the level of contaminants that may require treatment. All sampling and analyses conducted to support the treatability assessment of the southern pools and the Interim Response Actions will be conducted using U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) approved methods and protocols.

To evaluate the risk to human health as a result of off-gassing during Basin F Interim Response Actions, acceptable exposure concentrations will be determined for both workers and the general public. Using a Gaussian diffusion model, the maximum allowable emission rate that would not result in an exceedance of the acceptable concentration at different distances from the

site will be calculated. Finally, the maximum emission rate will be related to the in-place soil concentration by use of an emission model.

2.0 INVESTIGATIVE PROGRAM

2.1 SOIL, LIQUID, AND WATER SAMPLING

Sampling of soils, liquids, and water in and around Basin F will be performed to support the Removal Actions being conducted by the COE. All sampling will be conducted with approved sampling techniques that use approved protocols for sample preparation, containers, shipping, and handling; chain-of-custody procedures; documentation; and quality assurance and quality control procedures. The approved sampling procedures are described in Section III of Volume I: Sampling (Ebasco, 1985b), and in Section 8 of Volume II: Project Quality Assurance Plan (Ebasco, 1985c) of the Rocky Mountain Arsenal Procedures Manual to the Technical Plan (hereafter referred to as the Procedures Manual). These procedures were developed from the USATHAMA Sampling and Chemical Analysis Quality Assurance Program (USATHAMA, 1982) and from the U.S. Environmental Protection Agency sampling procedures (EPA, 1980).

2.1.1 Basin F Liquid and Sludge Sampling

Samples may be collected from the Basin F sludge and liner cover material to document the contamination associated with these substances. Samples may be collected from the Basin F liquid pools to characterize the liquid for any treatment and/or handling considerations of the Interim Action.

Liquid samples from Basin F will be grab samples collected using the standard techniques described in Section 2.1.3, Liquid Sampling. Depending on field conditions, sludge and liner cover material will be sampled either as grab samples or by using standard soil sampling techniques, as described in Section 2.1.2, Soil Sampling. Several grab samples may be combined to form a composite sample. Approved sampling procedures are based on USATHAMA procedures (USATHAMA, 1982) and are described in Volumes I and II of the Procedures Manual (Ebasco, 1985b, 1985c).

2.1.2 Soil Sampling

Soil samples may be collected to verify the effectiveness of cleanup activities. These samples may be taken during or after construction of the Interim Response Action, as directed by PM-RMA.

Soil samples will be collected using either a hollow stem auger and drill rig or a hammer-driven core barrel. These techniques will enable the collection of continuous, relatively undisturbed samples. Sampling depths will be determined after receipt of the specific work assignments. Approved soil sampling techniques are described in Volumes I and II of the Procedures Manual (Ebasco, 1985b, 1985c).

2.1.3 Liquid Sampling

Samples from the Basin F liquid pools may be collected and analyzed to characterize the liquids for the Interim Response Action. Sampling of these liquids will be conducted using a pond sampler, a weighted bottle sampler, Kemmerer bottle sampler, a Coliwasa sampler or other appropriate grab sampling technique. The type of sampler used will depend on the depth and location of the required samples and on available access to the site by personnel. Approved procedures for using these samplers are described in Volumes I and II of the Procedures Manual (Ebasco, 1985b, 1985c).

Samples may be collected from wells downgradient of Basin F and analyzed to document the levels of groundwater contamination and to support the COE design of a groundwater treatment system. Sampling of groundwater monitoring wells will be conducted using a standard well sampling pump or bailer. Detailed procedures for cleaning the pump or bailer, purging the well, and collecting the sample are described in Volume II of the Procedures Manual (Ebasco, 1985c).

2.2 TECHNICAL SUPPORT OF BASIN F INTERIM RESPONSE ACTIONS

A groundwater extraction, treatment, and reinjection system will be constructed north of Basin F as part of the Interim Response Actions being conducted by the COE. Ebasco will provide technical support for this project as requested by PM-RMA which will consist of literature searches, review of

COE design documents, technical assessments, and participation in design review meetings. Support for the Basin F Removal Action will consist of measuring Basin F liquid volume and determining the need to include the southern pools of liquid in the Interim Response Action.

2.2.1 Hydrogeologic Assessments

The groundwater extraction system will be located in the alluvial channel which trends northward under Basin F. Information from well logs, hydrogeologic and engineering reports, and chemical analytical data must be compiled and analyzed to determine the exact location of the alluvial channel and the proper spacing and sizing of the extraction wells. The required spacing between the extraction and reinjection systems to minimize interferences between the systems will also be an important design consideration. The Ebasco team will provide technical assessments of the COE directed designs of the location and size of the two systems.

2.2.2 Groundwater Treatment Assessments

Treatment alternatives under consideration will be designed to remove both organic and inorganic contaminants from the groundwater. Existing groundwater interception and treatment systems at the RMA have been designed and constructed to only remove organic contaminants. These treatment systems are the North Boundary, the Northwest Boundary, and the Irondale systems. Removal of inorganic contaminants by the Interim Response Action interception and treatment system will allow more flexibility in operating the existing boundary treatment systems, especially the North Boundary system. Removal of inorganics will also aid in providing an effluent which meets the drinking water standards.

The COE and supporting contractors are evaluating treatment alternatives and developing a conceptual design for a treatment system to meet the prescribed treatment goals. The COE contractor will evaluate the capital and operating costs of possible treatment trains and the operational and treatment flexibility of the various treatment trains. In support of the Interim Response Action, the Ebasco team may evaluate the treatment objectives, the

treatment alternatives, the rationale for the alternative that is selected, and the applicable or relevant and appropriate requirements, standards, or criteria. The Ebasco team will also summarize the significant comments received from Memorandum of Agreement (MOA) parties and will assist the U.S. Army in developing responses to those comments.

2.2.3 Basin F Volume Measurements

Part of the Basin F Removal Action will include transferring the liquid in the basin to storage tanks constructed by Shell. The volume of the liquid is critical to preparing cost estimates for this removal. This volume will vary, depending on the amount of solar evaporation and precipitation that occurs prior to actual removal. As the exact start date of the removal activities is unknown, several volume measurements may be required to adequately determine the volume to be removed.

The Ebasco team will provide periodic volume estimates of the liquid in Basin F as requested by PM-RMA. These estimates will be based on the elevation of the liquid as determined by level surveys and the capacity table presented in Table 2.2-1.

2.2.4 Treatability Assessment of Southern Pools

The liquid in the southern pools of Basin F is assumed to be primarily accumulated precipitation. If this liquid can be treated by conventional techniques, it will avoid needless tanking and storage of this liquid and provide valuable and expensive storage space for "true" Basin F liquid of the North Pool. The Ebasco team will sample and analyze the liquid to determine its chemical characteristics. Based on the results of this analysis, Ebasco will determine if the liquid can be treated and disposed by conventional methods.

The evaluation will consider both on- and off-site treatment and disposal options, and will be based on available data from the literature and the chemical characterizations developed as part of this task. The final report for this work assignment will include a recommendation for an acceptable

TABLE 2.2-1
VOLUME OF LIQUID CONTAINED IN BASIN F WITH RESPECT TO
ELEVATION AND SURFACE AREA*

Elevation of Liquid Surface (ft)	Surface Area (square feet)	Total Volume (cubic feet)	Total Volume (gallons)
5,187.5	0	0	0
5,187.6	32,902	1,695	12,679
5,187.7	62,946	6,537	48,897
5,187.8	116,719	15,520	116,090
5,187.9	164,922	29,602	221,423
5,188.0	235,113	49,604	371,038
5,188.1	298,899	76,305	570,761
5,188.2	377,015	110,101	823,555
5,188.3	477,189	152,811	1,143,026
5,188.4	594,049	206,373	1,543,670
5,188.5	692,788	270,715	2,024,948
5,188.6	801,146	345,411	2,583,674
5,188.7	877,780	429,357	3,211,590
5,188.8	949,218	520,707	3,894,888
5,188.9	1,021,813	619,258	4,632,050
5,189.0	1,095,872	725,142	5,424,062
5,189.1	1,162,585	838,065	6,268,726
5,189.2	1,226,092	957,499	7,162,093
5,189.3	1,285,126	1,083,060	8,101,289
5,189.4	1,312,055	1,212,989	9,073,158
5,189.5	1,345,228	1,345,783	10,066,457
5,189.6	1,371,633	1,481,626	11,082,562
5,189.7	1,398,556	1,620,135	12,118,610
5,189.8	1,426,007	1,761,363	13,174,995
5,189.9	1,453,997	1,905,363	14,252,115
5,190.0	1,482,537	2,052,189	15,350,374
5,190.1	1,501,403	2,201,386	16,466,367
5,190.2	1,520,510	2,352,482	17,596,565
5,190.3	1,539,859	2,505,500	18,741,140
5,190.4	1,559,455	2,660,466	19,900,286
5,190.5	1,579,300	2,817,404	21,074,182
5,190.6	1,599,397	2,976,338	22,263,008
5,190.7	1,619,751	3,137,296	23,466,974
5,190.8	1,640,363	3,300,302	24,686,259
5,190.9	1,661,238	3,465,382	25,921,057
5,191.0	1,682,378	3,632,562	27,171,564

* Based upon survey conducted June 1984. (ARIX, 1984)

disposal alternative. Supporting documentation for the recommended alternative will include calculations, schedule implications, and cost estimates.

2.2.5 Off-Gassing of Ammonia and Other Volatiles

A preliminary risk assessment will be performed to determine whether there is a hazard to human health as a result of Interim Response Action activities at Basin F. The risks resulting from ammonia off-gassing during absorption of Basin F sludge by soil or fly-ash, or volatile emissions during excavation of waste pile materials will be evaluated. The three groups of potential receptors to be considered are: (1) the Interim Response Action work force who will be using respiratory and skin protection; (2) nearby workers at the Air Force station who will not be wearing protection; and (3) the off-post general public who will not be wearing special protection.

The risks to human health will be evaluated by comparing the predicted in-place concentrations to available Basin F data. Since these evaluations are preliminary in nature, both in terms of the simplistic models used and the estimated model inputs, the accuracy of the predictions will be within two to three orders of magnitude. Therefore, if actual concentrations are within two orders of magnitude of predicted concentrations, a hazardous condition may exist and more detailed modelling and risk evaluations may be required.

2.3 TASK SCHEDULE

Figure 2.3-1 presents the estimated schedule for completing Task 31. Each of the major work elements associated with this task is illustrated. Changes to this schedule may occur as overall RMA priorities and specific work assignments change.

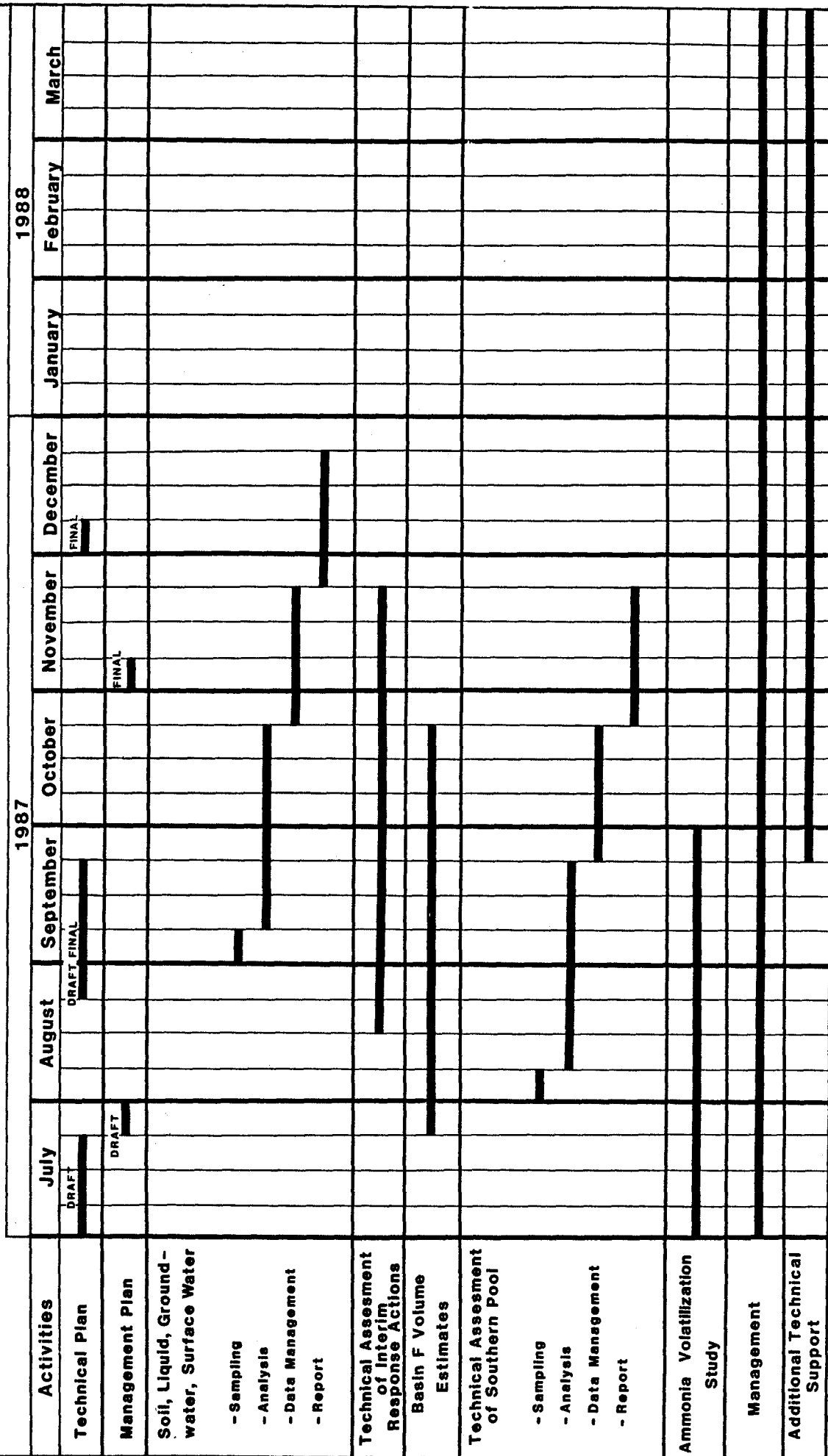
3.0 CHEMICAL ANALYSIS PROGRAM

The chemical analysis program for the samples collected to support the Basin F Interim Response Action will be performed by certified methods as previously developed under Task 2 and presented in the Final Technical Plan for Task 2 (Ebasco, 1985a). The procedures to be used are those developed for Phase II

Figure 2.3-1

PROJECT SCHEDULE
TASK 31

ROCKY MOUNTAIN ARSENAL



Analysis and are outlined in Section 4.2.3 of the Task 2 Technical Plan (Ebasco, 1985a). The analysis of soil, sludge, and liquid samples will be used to characterize the contamination associated with these materials, and will be analyzed by the methods listed below:

<u>ANALYTES</u>	<u>METHOD</u>
Organochlorine Pesticides	GC/EC
Organosulfur Compounds	GC/FPD
DIMP and DMMP	GC/FPD
Metals	ICP
Mercury	CV/AA

Sample preparation, containers, shipping, handling, chain-of-custody procedures, etc., will be consistent with those used in Task 2 as outlined in the Procedures Manual to the Technical Plan, Volume I: Sampling (Ebasco, 1985b).

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROGRAM

The QA/QC Program for Task 31 will be consistent with the approved QA/QC project program described in the Rocky Mountain Arsenal Procedures Manual to the Technical Plan, Volume II: Project Quality Assurance Plan (Ebasco, 1985c). The QA/QC Program adheres to all of the requirements of USATHAMA'S QA/QC Program (USATHAMA, 1982) except where modified for this project.

5.0 DATA MANAGEMENT PROGRAM

The data management procedures to be employed for Task 31 will be consistent with the approved procedures presented in the Task 2 Final Technical Plan (Ebasco, 1985a). PM-RMA has provided a PC-based IR Data Management System for this purpose.

6.0 HEALTH AND SAFETY PROGRAM

The Health and Safety Program described in the Procedures Manual to the Technical Plan, Volume III (Ebasco, 1985d) will be used for the Task 31 program. The safety program for this task will be implemented by an on-site

health and safety coordinator. Any new member of the sampling team will be thoroughly trained in health and safety activities. The level of personal protection necessary for the sampling effort will be determined by the on-site health and safety coordinator prior to any sampling activities. The command post and decon facilities established for all Ebasco RMA field activities will be utilized for Task 31. The actual Contamination Reduction Zone and Exclusion Zone for the sampling program will be established by the on-site health and safety coordinator upon a reconnaissance of the area to be sampled. During the sampling event, all sampling team members will be routinely monitored for medical problems.

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